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The Contribution of Labour Markets, Demographics and Public Redistribution to Inequality: A Decomposition Analysis for Canada, 1986-1996

Marcelin Joanis[1]
Edgard Rodriguez[2]

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[1] Department of Finance, joanis.marcelin@fin.gc.ca

[2] Asian Development Bank

Abstract

The paper examines the evolution of the inequality of family income in Canada during the 1986-1996 period. Our main objective is to understand why overall market income inequality rose, while that of disposable income did not. To analyze this question, we use data from the Survey of Consumer Finances and two distinct decomposition methodologies. First, by decomposing entropy indices (Theil index and mean logarithmic deviation), we look at the impact of various family characteristics on market and disposable income inequality in 1986 and 1996. We analyze the rise in market income inequality and the impact of the tax and transfer system on the basis of those results. Second, by decomposing the Gini coefficient, we investigate the equalizing role of private and public income sources. Those results allow us to assess the respective role of taxes and public transfers in a context of rising market income inequality.

We find that labour market characteristics of the family (labour force attachment, part-time/full-time work) were the most important factors to explain both levels and growth of market income inequality. Demographic characteristics such as family structure and age also played a significant but smaller role. The increase in the population shares of single mothers, together with the relative deterioration of the average income of younger and one-person families have exacerbated the upward pressure on inequality created by the decrease in employment and the rise of part-time work. Population ageing and geographic disparities have not been significant factors of the growth in market income inequality between 1986 and 1996.

Our results suggest that public redistribution was unevenly successful in eliminating between-group inequality arising from different family characteristics. Its equalizing effect was strong for between-group inequality arising from labour force attachment and old age (characteristics that are well targeted by transfer programmes), but it was smaller for inequality arising from demographic characteristics of the family. We conclude that the stabilizing action of the tax and transfer system and rising taxes were jointly responsible for the stability of disposable income inequality between 1986 and 1996.

JEL codes: D3, H2, J1.

Résumé

Ce document de travail examine l'inégalité des revenus entre les familles canadiennes au cours de la période 1986-1996. Il vise principalement à comprendre pourquoi l'inégalité du revenu de marché s'est accrue, alors que l'inégalité du revenu disponible est restée relativement stable. Pour analyser cette question, nous avons recours à une approche de décomposition, que nous appliquons à l'Enquête sur les finances des consommateurs. La décomposition des indices d'entropie de Theil nous permet d'étudier l'impact de différentes caractéristiques familiales sur l'inégalité du revenu de marché et du revenu disponible en 1986 et en 1996. Nous expliquons l'augmentation de l'inégalité du revenu de marché sur la base de ces résultats. Ensuite, en décomposant le coefficient de Gini, nous étudions le rôle égalisateur de diverses sources de revenu privées et publiques. Les résultats de ce second exercice de décomposition nous permettent d'étudier les rôles respectifs des taxes et des transferts gouvernementaux dans un contexte de croissance de l'inégalité du revenu de marché.

Nous trouvons que les caractéristiques familiales liées directement au marché du travail (participation ou non au marché du travail, travail à temps partiel ou à temps plein) ont été les plus importantes pour expliquer tant le niveau que la croissance de l'inégalité du revenu de marché. Les caractéristiques démographiques comme la structure familiale et l'âge ont aussi joué un rôle significatif, mais moins important. L'augmentation du nombre de mères monoparentales, de même que la détérioration du revenu moyen des jeunes familles et des personnes seules ont exacerbé les pressions à la hausse sur l'inégalité créées par le déclin du taux d'emploi. Le vieillissement de la population et les différences géographiques n'ont pas été des facteurs d'inégalité significatifs entre 1986 et 1996.

Nos résultats montrent que la redistribution publique connaît un succès inégal dans l'élimination de l'inégalité entre les sous-groupes de la population. Son impact égalisateur a été fort quant à l'inégalité provenant du faible attachement au marché du travail et à la vieillesse, mais il a été plus mitigé lorsqu'il est question du revenu relativement faible des personnes seules, des familles monoparentales et des travailleurs peu qualifiés. Nous concluons que l'action stabilisatrice du système fiscal et la hausse des taxes sont conjointement responsables de la stabilité de l'inégalité du revenu disponible entre 1986 et 1996.

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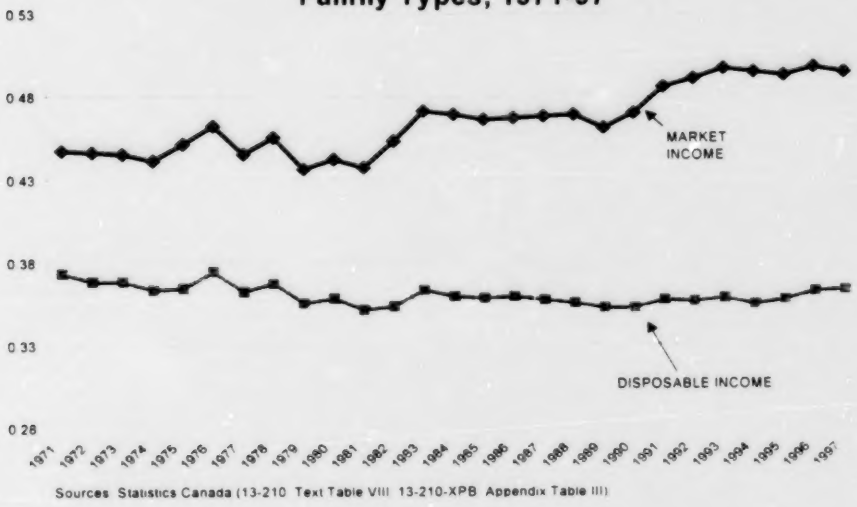
Introduction

Market income inequality has risen in many industrialized countries during the 1980s and the 1990s, including Canada. However, the Canadian experience differs from that of, for example, the U.S. and the U.K. with respect to government involvement in reducing inequality. When taxes and public transfers are taken into account, disposable income inequality in Canada did *not* increase significantly since the early 1980s. Figure 1 displays time series of the Gini coefficient for two income concepts: market income (excluding taxes and transfers) and disposable income (including taxes and transfers). It shows that while inequality of disposable income has remained quite stable since the 1970s, market income inequality experienced two episodes of fast growth coinciding with the recessions of the early 1980s and the early 1990s, after which inequality never returned to its pre-recession levels.

Figure 1. Market and Disposable Income Inequality, All Family Types, 1971-97



Sources: Statistics Canada (13-210 Text Table VIII, 13-210-XPB Appendix Table III)

An important share of Canada's resources is devoted to reducing inequality through the tandem formed by public transfers and progressive taxation. The management of transfer programmes has become a central mission of both the Federal and provincial governments. The action of the tax and transfer system has kept inequality levels roughly constant in the last two decades, despite important forces tending to increase inequality. The objective of this paper is to identify and analyze some of the main factors that drove income inequality in Canada over that period, and to understand how the tax and transfer system has dealt with each of these factors. Our focus is on the relative importance of labour markets and demographics to explain both market and disposable income inequality. We especially emphasize the role of two demographic phenomena that will undoubtedly have considerable influence on the conduct of policy in the near future: population ageing and changing family structures.

Income inequality is not a new topic in Canadian research. The first words of a report published in 1977 by Health and Welfare Canada were the following: "As there is a growing interest in questions related to the distribution of family income in Canada, there is a growing number of often conflicting diagnoses and prescriptions[3]." A huge literature on income inequality has been developed since then. This brief review discusses some of the most recent contributions. The income concept (e.g. labour earnings, market income, disposable income) and the population considered (e.g. individuals, families, employees, working-age population) are crucial to the conclusions reached by the authors, and to their interpretation.

An abundant empirical literature documents the trends in inequality of *individual labour earnings* in Canada[4]. There is a consensus that earnings inequality has grown importantly from the mid-1970s to the mid-1980s. However, individual earnings inequality has been relatively stable since the mid-1980s, our period of interest. Using the Survey of Consumer Finances (SCF) – the most widely used data source in the inequality literature in Canada – Picot (1997, 1998) finds that the Gini coefficient for earnings of all paid workers remained virtually unchanged at around 0.418 from 1985 to 1995. Also using SCF data, Murphy and Wolfson (1998) conclude that roughly all the growth in individual earnings inequality happened before 1985, with no seemingly significant increase between 1985 and 1995. Studies conducted on non-SCF data reach similar conclusions. Using the Longitudinal Administrative Database (LAD), a 10 per cent sample of Canadian tax filers followed over time, Finnie (1997) computes a moderate 3.8 per cent increase in the Gini for individual earnings over the period 1983-1992. Also using longitudinal tax data, Baker and Solon (1999) decompose this growth into its persistent and transitory components to find that the growth in earnings inequality reflects both an increase in long-run inequality and an increase in earnings instability.

According to Picot (1998), "this relative stability in overall earnings inequality since the mid-1980s masks a number of offsetting underlying trends. Some groups of workers are making earnings gains (notably older workers and women) while others are losing (notably younger workers and men)." The trends experienced by men and women have been very different. According to Zyblock (1996a), the 1981-93 period was characterized by two opposing trends. First, the richest 30 per cent of males benefited from large earnings gains, while the earnings stagnated in the remainder of the male earnings distribution, therefore producing inequality increasing pressures. Second, women saw their income growing significantly over the period, hence reducing earnings inequality.

When the non-working population is included as well in the analysis, the trend is somewhat different than that of individual earnings (see again Figure 1). There is convincing evidence that the inequality of *market income* among Canadian individuals

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[3] Health and Welfare Canada (1977).

[4] Selected recent studies include Zyblock (1996a), Finnie (1997), Picot (1997), Picot (1998), and Baker and Solon (1999).

and families has increased quite substantially since the mid-1980s[5]. Trends in the employment rate are closely linked to market income inequality. Sharpe and Zyblock (1997) find that higher unemployment explains one-third of the rise in market income inequality between 1975 and 1994. Zyblock (1996b) also underlines the important role of demographics in explaining the growth of market income inequality among working-age families. Using a decomposition methodology, he reveals the importance of changes in family structure, especially the trend towards more lone-parent families.

The inclusion of taxes and public transfers considerably modifies the shape of inequality trends. As shown by Figure 1 above, disposable income inequality has remained quite stable since the 1970s, even showing a slight downward trend. This is emphasized in the literature on the inequality of family disposable income[6]. Duclos and Tabi (1999) provide a comparative analysis of the equalizing role of different categories of transfers in the 1980s. They find that, in 1990, elderly-specific transfers had the biggest equalizing impact, followed by the income tax, the Quebec/Canada Pension Plan, social assistance and EI. Osberg, Erksoy and Phipps (1997) argue that employment insurance (EI) has played an important role in offsetting the increase in market income inequality in the 1980s.

The contribution of our paper is to analyze, in a unified framework, inequality levels and growth, as well as the impact of the tax and transfer system, in order to provide a broader view of recent inequality trends. We use different methodologies to decompose summary measures of inequality according to family characteristics and income sources[7]. These techniques are increasingly popular among researchers in this area. They have been applied in previous studies on Canada[8] and other countries[9]. Our contribution to the existing literature is to rank the inequality increasing effect of different labour market and demographic characteristics of the family, and to assess the equalizing role of taxes and transfers with regards to these different factors. While most previous studies have focused on subgroups of the population (working-age individuals or families, male workers, the elderly, etc), our work includes all Canadian families, with a particular emphasis on the contribution to inequality of the elderly population.

The paper is divided in four sections. In Section 1, we present the data, the methodology and different issues related to income inequality measurement. In Section 2, we quantify the contribution of selected family characteristics to the level of market income inequality

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[5] See Zyblock (1996b), Sharpe and Zyblock (1997), and Zyblock and Tyrrell (1997).

[6] See Osberg (1996), Osberg, Erksoy and Phipps (1997), Murphy and Wolfson (1998), and Duclos and Tabi (1999).

[7] A different approach would consist in the use of econometric techniques. See Sharpe and Zyblock (1997) and Baker and Solon (1999).

[8] See Osberg (1996), Zyblock (1996b), Zyblock and Tyrrell (1997) and Myles (2000).

[9] Selected studies include Cowell and Jenkins (1995), Garner and Terrell (1998), Ferreira and Litchfield (1998), Parker (1999) and Oxley et al. (1999).

in 1986 and 1996, using a decomposition of the Theil index. We then combine the results from this decomposition exercise with those of a decomposition of the mean logarithmic deviation to rank our selected variables according to their contribution to market income inequality growth over the 1986-1996 period. The relative contributions of labour market changes, population ageing and changing family structures are discussed. In Section 3, we decompose disposable income inequality according to the same family characteristics. Comparing the results for market and disposable income allows us to assess the impact of public redistribution on the contribution of each variable to inequality. We complete this discussion on the equalizing role of taxes and transfers by exploring the contribution to inequality of different income sources (both private and public) based on a decomposition of the Gini coefficient. We discuss the respective impact of public transfers – as automatic stabilizers of the inequality level – and rising taxes. Section 4 concludes.

1. Data and Methodology

This first section presents our methodological choices and some aggregate estimates of income inequality for 1986 and 1996.

1.1 Measuring and Adjusting Incomes

Our analysis is based on the public-use data files of the Survey of Consumer Finances (SCF) for economic families[10]. We use the 1987 and 1997 files of the SCF, which contain income information for 1986 and 1996 respectively[11]. Both surveys are comparable in general. However, the SCF has been continuously improved since 1987 and some modifications have had non-negligible impacts on data comparability. Limitations imposed by data comparability will be addressed further when relevant to the discussion. Because market income inequality is closely linked to macroeconomic fluctuations (it tends to rise during recessions), it was important to choose comparable years in terms of the business cycle. According to the Labour Force Survey, the unemployment rate was identical in 1986 and 1996, at 9.6 per cent[12]. Although the unemployment rate is only an imperfect indicator of the conjuncture, we can think of 1986 and 1996 as corresponding to similar points of the business cycle, at least in first approximation.

We performed some minor modifications to the SCF databases. First, we removed a small number of extreme observations[13]. Second, following Zyblock and Tyrrell (1997), we attributed an income of one penny to families reporting zero income. This small adjustment is required so that these families are taken into account in all the calculations. In contrast with some other studies, families reporting zero or negative income are kept in the sample. Their number is very small for disposable income, but relatively large for market income: families reporting zero market income represented 8.4 per cent of the sample in 1986 and 10.4 per cent in 1996. There has thus been a clear increase in that subgroup of the population. Keeping it in the database allows us to incorporate this trend in the analysis. Finally, the 1986 database is re-expressed in 1996 dollars using Statistics Canada's Consumer Price Index (CPI, all items).

We then perform important adjustments to our data to make family income a better proxy to individual welfare[14]. First, we assume that each individual receives an equal share of the income of his economic family, regardless of his financial contribution and needs.

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[10] According to Statistics Canada (1997), an economic family is a group of individuals sharing a common dwelling unit who are related by blood, marriage (including common law relationship) or adoption.

[11] In the remainder of the paper, we shall refer to the years for which the data are relevant (1986 and 1996), rather than the years when the data were collected (1987 and 1997).

[12] Statistics Canada (2000).

[13] See Appendix A.1 for details.

[14] Interesting further research would use consumption and wealth, arguably better – but harder to measure – proxies to individual welfare.

Thus, each family is attributed its per capita income[15]. Second, as it has become a common practice among researchers in this area, we then adjust those per capita incomes to reflect the economies of scale in consumption associated with family size. In addition to this standard adjustment, we also adjust our data for spatial price differences. Both adjustments are achieved through the equivalence scale implicitly embodied in Statistics Canada's 'low income cut-offs' (LICOs)[16]. The equivalence scale distinguishes families of one to seven people in five different sizes of area of residence[17], i.e. 35 cases.

The LICOs' implicit equivalence scale captures the fact that a same per capita income is worth more than proportionally in large families than in small families, because of the presence of economies of scale. The per capita income of a family is multiplied by the appropriate coefficient in the adjustment matrix (see table A2 in the appendix). For example, $1,000 of income for an individual living on his own in a large city is considered equivalent to $625 of per capita income for an individual also living in a large city but in a two-person family[18]. Stated differently, to be considered as rich as a one-person family earning $1,000, a two-person family does not need twice this amount ($2,000), but only $1,250, that is, 37.5 per cent less. The adjustment also takes into account price differentials across large cities, small cities and rural areas. For example, $1,000 of income for an individual living alone in a large city is considered equivalent to $690 of income for an individual living alone in a rural area[19]. The net effect of this adjustment for family size and area of residence is to boost the income of multiple-person families and of families living in non-metropolitan areas.

1.2 Measuring Inequality

Table 1 (on the next page) reports measures of market and disposable income inequality for 1986 and 1996 using our 'adjusted income' concept. Market income is the sum of the following four income categories[20]: Wages and salaries; Self-employment income; Investment income; and Private pensions. The addition of Elderly-specific transfers, Public pensions, Other transfers and Taxes generates disposable income. We present estimates and standard errors for three inequality indices: the Gini coefficient, the Theil

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[15] Contrary to some other studies, e.g. Osberg (1996), we do not transform family records into individual records. Therefore, the size of the database is unaffected by this adjustment.

[16] See appendix A.2 for details. For more on the choice of an equivalence scale, see Aaberge and Melby (1998).

[17] The adjustment takes into account price differences across large cities (those areas with over half a million inhabitants), medium-sized cities (with 100,000 to 500,000 inhabitants), small cities (30,000 to 100,000), towns (fewer than 30,000), and rural areas.

[18] $625 × 1.60 = $1,000.

[19] $1,000 ÷ 1.45 = $690.

[20] Income categories are defined in details in Appendix B.

index and the mean logarithmic deviation (MLD)[21]. Each of them will be used further in the paper because of their specific decomposition properties.

Table 1. Inequality Indices, Adjusted Per Capita Income, 1986 and 1996

Income	*1986*	*1996*	*Change (%)*
Market Income			
Gini	0.4356	0.4683	7.5
	(0.0033)	(0.0027)	
Theil	0.3370	0.3904	15.8
	(0.0058)	(0.0038)	
MLD	1.3269	1.7614	32.7
	(0.0261)	(0.0279)	
Disposable Income			
Gini	0.3108	0.3165	1.8
	(0.0032)	(0.0025)	
Theil	0.1613	0.1661	3.0
	(0.0020)	(0.0018)	
MLD	0.2269	0.2053	-9.5
	(0.0076)	(0.0045)	

Note 1: The summary measures have been calculated in STATA, using the sg30 'a-do file' (for details, see Whitehouse (1995)).

Note 2: Standard errors are reported between parentheses. For the Gini and the Theil, they have been calculated in STATA, using the sg104 'a-do file' (see Jenkins (1999)). For the MLD, we used *DAD: A Software for Distributive Analysis/Analyse distributive* (see Duclos et al. (1999)). Unlike the sg30 routine, the sg104 routine discards negative incomes. This slight difference does not affect the results significantly.

All three indices are higher in 1996 than in 1986 for market income, and the size of the standard errors suggests a significant increase in market income inequality. However, consistent with Figure 1, the trend is unclear for disposable income inequality. The Gini and the Theil show a small increase in disposable income inequality, but the MLD moves in the opposite direction. For all three measures, the standard errors are high relative to the change in the summary measure between 1986 and 1996, indicating low statistical significance. The difference in the trends and the relative magnitudes of the three indices is dependent upon their respective properties, especially that they are not equally sensitive to the bottom of the income distribution. The MLD puts greater weight on the bottom of the distribution than the Gini coefficient and the Theil index, which both apply equal weights across the distribution. Therefore, using more than one inequality index provides a better picture of the actual changes in the income distribution[22].

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[21] See Appendix D for the mathematical formulae of the inequality indices.

[22] For a concise presentation of the properties of these inequality measures (including decomposition methods), see Litchfield (1999).

Given the imperfect nature of summary measures, a look at the Lorenz curves (a graphical representation of the income distribution) can be insightful. Figure 2 (on the last page of this document) plots four Lorenz curves, two for each year under study. The X-axis measures the cumulative share of the population (ranked from the lowest to the highest income), and the Y-axis measures the cumulative income share. Consequently, each point of a Lorenz curve is the cumulative income share earned by a given portion of the population. For example, we can see from Figure 2 that 60 per cent of the population (the third quintile) owns approximately 25 per cent of market income and 35 per cent of disposable income. The closer the Lorenz curve is to the 45° line, the more equal is the income distribution.

For both years, the entire Lorenz curve for market income lies outside the disposable income curve. The distribution of market income is thus undoubtedly less equal than the distribution of disposable income, as suggested by all three summary measures reported in Table 1. However, for both income concepts the Lorenz curves for 1986 and 1996 cross. Therefore, we cannot declare that the 1996 distribution is strictly more unequal than the 1986 distribution (i.e. that the 1986 distribution dominates that of 1996 in Lorenz's sense). The crossing in the Lorenz curves is reflected in the reverse sign of the change in the MLD for disposable income.

This short (and obviously incomplete) discussion of inequality measurement highlights the fact that the sole use of a single scalar to analyze inequality trends is generally insufficient to depict the complex movements occurring within the income distribution over time. In order to shed some light on the summary measures presented in this section, the remainder of the paper is dedicated to the decomposition of these inequality indices using different methodologies developed in the literature.

2. Employment, Demographics and Market Income Inequality

The objective of this section is to identify the main forces tending to increase inequality that operated on the distribution of market income between 1986 and 1996. In Section 2.1, we decompose the Theil index in order to identify and quantify different factors of the *level* of market income inequality in 1986 and 1996. In section 2.2, we calculate the proportion of the *change* in market income inequality that can be attributed to these factors on the basis of section 2.1's results. In Section 2.3, we present complementary results from a dynamic decomposition of the MLD. The results of both decomposition methods are analyzed jointly in Section 2.4. The use of market income in this section and the following – before turning to disposable income in Section 3 – will allow us to isolate the equalizing impact of public redistribution. Given that the primary goal of most public transfers and the progressivity of the tax system is to address some kind of income inequality problem, their inclusion tends to mask the other forces at work.

2.1 The Fundamentals: Explaining Inequality Levels

In this section, we use a methodology developed by Mookherjee and Shorrocks (1982) to quantify how much inequality can be 'explained' by the differences in average income among population subgroups, defined according to a given set of family characteristics. It requires the use of an 'additively decomposable' inequality index. The Theil index and the MLD share this mathematical property, but not the Gini coefficient[23]. Most of our analysis will rely on the Theil index, which is not biased towards any portion of the income distribution (contrary to the MLD). An additively decomposable index can be decomposed as the sum of two components: an 'explained' and an 'unexplained' component. Some inequality arises from differences *between* the average incomes of the subgroups: the explained portion. The remaining part is due to inequality *within* the subgroups. Hence, the portion of inequality that a variable 'explains' can be referred to as the 'between contribution', and the unexplained portion as the 'within contribution'. Following Mookherjee and Shorrocks (1982), we know that the Theil index can be decomposed in the following way:

$$E(1) = \underbrace{\sum_{j=1}^{k} v_j \lambda_j \log \lambda_j}_{\text{between}} + \underbrace{\sum_{j=1}^{k} v_j \lambda_j E(1)_j}_{\text{within}} \qquad (1)$$

where $j \in \{1,\ldots,k\}$ identifies a particular subgroup of the population, v_j is the population share of group j, λ_j is the ratio of the mean income of group j to the mean income of the total population, and $E(1)_j$ measures inequality in subgroup j. In this paper, we will

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[23] For more on additively decomposable inequality measures, see Shorrocks (1980).

alternatively decompose the population of families according to nine variables (see Appendix E for details).

From Equation 1, we can derive the 'explanatory power' of a variable in year *t*:

$$\varphi^t = \frac{between^t}{E(1)^t} = \frac{\sum_{j=1}^{k} v_j^t \lambda_j^t \log \lambda_j^t}{E(1)^t} \qquad (2)$$

Table 3 below reports the value of φ^t in both years for the nine variables listed in Table 2. It is important to note that, in a particular decomposition, this method does *not* control for the impact of the eight other variables. Hence, the numbers in each column cannot be summed together, especially given that some of them are highly correlated (e.g. Age and Number of Seniors).

Table 3. Decomposition of the Theil Index, Explanatory Powers, 1986 and 1996, Market Income

Variable	*1986 (%)*	*1996 (%)*
Labour market variables		
Labour Market Situation	32.0	35.2
Labour Force Attachment	26.1	27.0
Education[24]	15.7	17.4
Demographic variables		
Age	14.7	13.5
Life Cycle	12.1	12.0
Single Parenthood	10.3	11.7
Number of Seniors	9.7	8.5
Number of Adults	8.0	9.1
Geographic variable		
Region of Canada	1.3	1.4

The fact that an important proportion of the population does not work in a given year – either because of school attendance, unemployment, disability, retirement, etc. – comes out as the primary source of market income inequality. The Labour Force Attachment variable divides the population in two groups: families receiving no labour earnings, and the others. It explains 26.1 per cent of the inequality level in 1986 and a slightly higher portion in 1996 (27.0 per cent). The Labour Market Situation variable further divides the 'others' group of the Labour Force Attachment variable according to the type of work (part-time or full-time) in which the head of the family and his or her spouse (if any) are involved. It explains roughly one third of market income inequality in a given year, that is, twice as much as our Age variable. The predominance of labour market variables over

[24] Important changes were made to the Education variable between the 1986 and 1996 surveys. Therefore, both years are not comparable.

demographic variables therefore appears clearly. Geographic discrepancies across regions of Canada are not a major source of market income inequality, since they only explain 1.3 per cent of market income inequality. It must however be noted that the equivalence scale might bias this result downwards.

The magnitude of our results is comparable with those obtained from similar exercises for other countries. In a recent study on inequality in the United Kingdom, Parker (1999) finds that working full-time or part-time explained 37.7 per cent of earnings inequality among employees in 1994/95[25]. He then finds the following explanatory powers for other variables: Occupation (34.6 per cent), Gender (17.2 per cent), Age (13.3 per cent), Education (7.9 per cent), Married (2.6 per cent) and Region (2.4 per cent). Like us, Parker finds that labour market variables have a better explanatory power than demographic characteristics, and that geography is not a dominant factor of inequality.

The explanatory power of our Education variable is 15.7 per cent in 1986 and 17.4 per cent in 1996. This relatively high explanatory power is in part driven by the fact that we consider the education level of both spouses (when applicable). Relative to other studies[26], we also find a high explanatory power for the Age variable (around 14 per cent in both years). Age affects market income inequality in two ways. First, this variable captures the effect of retirement. From the explanatory power of the Number of Seniors variable we can say that income differences between elderly and non-elderly families are responsible for 9 per cent of market income inequality. The residual (approximately 5 per cent) is the result of different outcomes in the labour market by age group. It captures, among others, the experience premium and the lower wages of the young.

Income differences between singles and families with more than one adult (the Number of Adults variable) also contribute significantly to the level of inequality observed in a given year (about one tenth). An important remark should be made at this point about the impact of the equivalence scale on the decomposition results. It can be shown that summary measures of inequality are not very sensitive to both the use of an equivalence scale and the choice of a specific one[27]. However, the equivalence scale has a crucial impact on comparisons between families of different sizes. Basically, what the equivalence scale does is to boost the per capita income of families with more than one member, based on the assumption that families generate economies of scale. A legitimate concern is the extent to which results showing an (adjusted) income gap between, for example, singles and couples are driven by the equivalence scale itself, i.e. by an *ad hoc* assumption. Table 4 (on the next page) reveals that such results rely largely, if not entirely, on hypotheses made on the size of the economies of scale.

Table 4. The Effect of the Equivalence Scale on the Number of Adults Variable

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[25] Parker (1999) uses the MLD.

[26] Osberg (1996), among others.

[27] The results from a sensitivity analysis can be obtained from the authors upon request.

Number of Adults in the Family	*Average Per Capita Market Income (1996)*	*Average Adjusted Per Capita Market Income (1996)*
1	$17,848	$20,305
2 or more	$17,662	$36,866

According to adjusted per capita incomes (second column), there is a $16,500 difference between families with one adult (but potentially children) and families with two or more adults. As a result, the Number of Adults variable explains 9.1 per cent of market income inequality in 1996. In contrast, when no adjustment is made (first column), the income gap between the subgroups vanishes. On average, each member of a multiple-person family even turns out to be poorer by $200 than singles! Consequently, the average income gap that we observe between singles and couples is the result of an *ad hoc* adjustment of incomes. Nevertheless, this exercise highlights the importance, in the context of a welfare analysis, of adjusting per capita incomes of multiple-person families to reflect the economies of scale arising from family size.

Life Cycle and Single Parenthood are extensions of the Number of Adults variable. Single Parenthood accounts for the gender of singles and divides them between parents and unattached individuals. In particular, this variable allows us to assess the contribution of single mothers to the level of market income inequality. This more detailed decomposition increases the explanatory power of Number of Adults by 2.3 percentage points in 1986 and 2.6 in 1996. In addition to separating unattached individuals from the rest of the population, Life Cycle classifies couples according to the age of the head (under or over 45) and to whether or not they have children under 16. A miscellaneous category, in which single-parent families fall, completes the picture. The explanatory power of Life Cycle surpasses that of Number of Adults by 4.1 percentage points in 1986 and 2.9 in 1996. Zyblock (1996b) performs a similar decomposition exercise using a composite variable divided into 20 categories according to four age groups, marital status and age of children – i.e. a more detailed Life Cycle variable labelled 'family type'. The explanatory power of this composite variable is considerably lower than the one that we obtain for Life Cycle. According to Zyblock's decomposition, family type explains only a mere 5 per cent of inequality in a given year (1981, 1984, 1989 and 1993), compared to the 12 per cent that we find for Life Cycle, although 'family type' is more detailed than Life Cycle. This important gap arises because of different methodological choices[28].

The complexity and the uniqueness of each family's experiences imply that a certain portion of inequality cannot be explained by any economic, demographic, geographic or even genetic characteristic. Nevertheless, this section sought factors of inequality that are

[28] First, the elderly population is excluded in Zyblock (1996b) and included here. The inclusion of this population may explain part of our relatively high results. However, more crucial is Zyblock's choice to decompose the MLD, which is much more sensitive to the inclusion of low-income families in the sample than is the Theil index. The inclusion of these families considerably increases the magnitude of the MLD estimates. Consequently, the within contribution (the second term in equation 1) is arbitrarily boosted, thus increasing its relative size compared to the between contribution and decreases the explanatory power of the variable. Therefore, Zyblock (1996b) may have understated the role of demographics on inequality.

likely to evolve over time and, hence, to help understand the recent *growth* in market income inequality, the goal that we pursue in the next section.

2.2 Explaining Growth in Market Income Inequality

In Section 2.1, we saw that the general *structure* of market income inequality was relatively close in 1986 and 1996, despite some small differences. We now turn to the contribution of each variable to market income inequality *growth*. Equation 3 defines the explanatory power of a variable with respect to the change in the Theil index between 1986 and 1996:

$$\hat{\varphi} = \frac{between^{96} - between^{86}}{E(1)^{96} - E(1)^{86}} = \frac{\Delta between}{\Delta E(1)} \qquad (3)$$

Table 5 below reports the percentage value of $\hat{\varphi}$ for each variable, along with the between contributions used to compute them. Given that Table 5 is based on the same decomposition results than Table 3, it is subject to the same limitations, the most important being that each decomposition exercise (each line of the table) does not account for the impact of other variables.

Table 5. Decomposition of the Change in the Theil Index, 1986-1996, Market Income

Variable	*Between Contribution 1986*	*Between Contribution 1996*	*Explanatory Power (%)*
Labour market variables			
Labour Market Situation	0.1078	0.1374	55.4
Labour Force Attachment	0.0879	0.1054	32.8
Demographic variables			
Single Parenthood	0.0347	0.0455	20.2
Number of Adults	0.0269	0.0356	16.3
Life Cycle	0.0407	0.0467	11.2
Age	0.0495	0.0527	6.0
Number of Seniors	0.0327	0.0330	0.6
Geographic variable			
Region of Canada	0.0044	0.0054	1.9
Theil index for the whole population	**0.3370**	**0.3904**	**100.0**

Note: Because of changes in the definition of the education variables in the SCF between 1986 and 1996, we do not report results for our Education variable in order to avoid spurious comparisons.

We find that the hierarchy established in Table 3 between labour market and demographic variables is preserved in Table 5. Nevertheless, the two tables show important differences. The capacity of the two labour market variables (Labour Market Situation and Labour Force Attachment) to explain inequality growth is substantially higher than their power to explain *levels*. Labour Market Situation explains 32.0 per cent of the

inequality level in 1986 and 35.2 per cent in 1996, but it accounts for more than half (55.4 per cent) of inequality growth. The explanatory power of Labour Force Attachment, Single Parenthood, Number of Adults and Region are also higher in Table 5 than their power to explain levels. Hence, Labour Market Situation, Labour Force Attachment, Single Parenthood, Number of Adults and Region of Canada have contributed more than proportionally to inequality growth between 1986 and 1996, while the opposite is true for Life Cycle, Age, and especially for Number of Seniors. If the latter explains nearly 10 per cent of the inequality level in a given year, its contribution to the change between 1986 and 1996 has been less than 1 per cent.

2.3 A Dynamic Decomposition of the MLD

In our framework, the inequality level can change either because of changes in the relative average incomes of the population subgroups, or because of changes in the population shares of the subgroups. Mookherjee and Shorrocks (1982) have developed an extension to the methodology introduced in Section 2.1 in order to decompose changes of inequality. They suggested a decomposition of the mean logarithmic deviation (MLD)[29]. Many researchers used this decomposition since then, including Ferreira et al. (1998), Oxley et al. (1999), Zyblock (1996b), and Zyblock and Tyrrell (1997). A change in the MLD index, $\Delta E(0)$, is decomposable in the following way:

$$\Delta E(0) \cong \underbrace{\sum_{j=1}^{k} \overline{E(0)}_j \Delta v_j + \sum_{j=1}^{k} \left[\bar{\lambda}_j - \overline{\log(\lambda_j)}\right] \Delta v_j}_{\text{share contribution (A)}} + \underbrace{\sum_{j=1}^{k} (\bar{\theta}_j - \bar{v}_j) \Delta \log(\mu(y)_j)}_{\text{between contribution (B)}} + \underbrace{\sum_{j=1}^{k} \bar{v}_j \Delta E(0)_j}_{\text{within contribution (C)}} \qquad (4)$$

Again, v_j is the population share of subgroup j, λ_j is the ratio of the mean of subgroup j ($\mu(y)_j$) to the mean of the population, and $\theta_j = v_j \lambda_j$. The lines over some variables designate the arithmetic mean. The 'share contribution' (A) is the portion of the variation that can be explained by changes in the relative size of the population subgroups. The 'between contribution' (B) is the portion explained by relative changes in the subgroup means. Finally, the 'within contribution' (C) shows the direction and the relative magnitude of the changes in inequality within each of the subgroups considered. It is the portion of the change remaining unexplained.

In line with our previous remarks, the MLD decomposition has to be used cautiously, especially for market income. Because an important number of families report zero market income in the SCF, the extreme sensitivity of the MLD to these records increases considerably the order of magnitude of the estimates. This property of the MLD appears clearly in Table 1 (Section 1.2): switching from market to disposable income changes the order of magnitude of the MLD, which is not the case for the Theil index and the Gini

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[29] As with the Theil index, the MLD belongs to the Theil 'generalized entropy' family of inequality measures, which are particularly suitable for decomposition analysis since they share the mathematical property of being additively separable.

coefficient. In equation 4, *E(0)* appears in term A, and $\Delta E(0)$ in term C. Those two terms are therefore subject to reach high values only because of their sensitivity to very low market incomes. In contrast, this is not the case for term B (the between contribution). The distortion caused by the presence of zeros in the database may thus lead to spurious comparisons of the relative sizes of the share and between contributions. We nevertheless present partial results from the MLD decomposition because it may provide insightful information about the mechanisms through which each variable explains inequality. Table 6 only reports the *signs* of A and B, and not their actual values in order to avoid a discussion of their relative sizes of the estimates[30].

Table 6. Decomposition of the MLD, 1986-1996, Market Income

Variable	*Sign of share contribution*	*Sign of between contribution*
Labour market variables		
Labour Market Situation	+	+
Labour Force Attachment	+	–
Demographic variables		
Single Parenthood	+	+
Number of Adults	+	+
Life Cycle	+	+
Age	+	–
Number of Seniors	+	–
Geographic variable		
Region of Canada	–	+

Note: A '+' (resp. '–') sign indicates that a variable increased (decreased) inequality over the period.

A positive *share* contribution reveals that changes in the population shares of the subgroups have exerted an upward pressure on market income inequality, while a positive *between* contribution indicates that changes in the subgroup mean incomes have been inequality increasing.

2.4 Understanding the Recent Trend in Market Income Inequality

We will interpret the decomposition results of Tables 5 and 6 in light of three important ongoing economic and demographic phenomena: trends in employment, changes in family structures, and population ageing.

Employment Trends

[30] An interesting direction for future research would be to look at the possibility of decomposing the change in more neutral measures, such as the Theil index.

Table 5 suggests that the main force behind the increase in market income inequality between 1986 and 1996 has been the decline in employment. This finding is consistent with the international comparisons of Gottschalk et al. (1997) and Oxley et al. (1999). Indeed, the population share of families reporting no earnings increased by 4.8 percentage points over the period[31], resulting in a positive share contribution in Table 6.

The labour market has recovered more slowly from the 1990s recession than from the 1980s'. Historical data on the employment rate support this observation. In 1986, the employment rate was 59.9 per cent and was about to reach its pre-recession level (1981) the next year. In contrast, the employment rate was 58.6 per cent in 1996, still far behind its 1989 level (62.4 per cent). Employment increased substantially since 1996 as Canada experienced favourable economic conditions. The employment rate stood at around 61 per cent by the end of 1999. This lag in the recovery from the last recession may well have resulted in a *temporary* increase in market income inequality due to anaemic labour demand. Other potential (supply-side) explanations of the observed increase in the proportion of families with no earner would include the increase in the share of retired individuals, the rise of early retirement and the decline in participation rates among young adults owing to increased enrolment rates.

The MLD decomposition shows a negative between contribution for the Labour Force Attachment variable. Indeed, the average market income of families with no earner increased at a higher rate (8.8 per cent) than that of families with at least one member in the labour force (4.4 per cent), thus contributing to reduce the market income gap between the two subgroups. The explanation to this must be found in the non-labour components of market income, i.e. private pensions and investment income. A plausible hypothesis is that a growing number of retired individuals have superior non-government financial resources than most working-age unemployed.

The Labour Market Situation variable has the highest explanatory power with 55.4 per cent. Out of this number, we know from the Labour Force Attachment variable that 32.8 percentage points are due to the decrease in employment. The important movement from full-time to part-time work is responsible for part of the remaining 22.6 percentage points. The population share of families where either the head or the spouse worked mostly part-time during the year increased by 3.4 percentage points between 1986 and 1996[32]. In addition, the average market income of families where both spouses worked full-time (the richer group) increased faster than the income of all the other subgroups of the population. Consequently, both the between and the share contribution were positive for the Labour Market Situation variable. The high explanatory power of Labour Market Situation is also consistent with the different labour market outcomes for women and men during the 1986-1996 period. Families with both spouses working experienced the highest increase in average market income (9.2 per cent), driven by important increases in the wives' earnings (20.2 per cent for wives working full-time).

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[31] See Appendix C, Table C2 for summary statistics on the Labour Force Attachment variable.

[32] See Table C1 in the appendix.

The Evolution of Family Structures

Most researchers now prefer to study individual welfare in the broader context of the family. The pertinence of this choice is confirmed by the relatively high explanatory power of Single Parenthood (20.2 per cent), Number of Adults (16.3 per cent) and Life Cycle (11.2 per cent). For all these three variables, the share and between contributions were positive, indicating that changes in both subgroup mean incomes and population shares put upward pressures on market income inequality.

The Number of Adults variable separates unattached individuals and single parents from the rest of the families. This simple decomposition comes out as our third inequality increasing variable. The Single Parenthood variable adds gender and parenthood to the Number of Adults variable. By taking the difference between the explanatory power of both variables, single parenthood itself may (loosely) be held responsible for an additional 3.9 per cent of the increase in market income inequality. Women head the vast majority of lone-parent families[33]. The population share of single mothers grew by 0.9 percentage points, from 2.9 per cent in 1986 up to 3.8 per cent in 1996. Their average market income, already a third of the Canadian average in 1986[34], dropped by 5.4 per cent. Meanwhile, multiple-person families experienced a 3.2 per cent increase in their market income.

Despite the fact that the Life Cycle variable accounts for differences between singles and couples (together with age and parenthood), its explanatory power is lower (11.2 per cent) than that of Number of Adults. This is due to the presence of *equalizing* trends driven by population ageing (see the next subsection). The unattached individuals aged 45 and over were the subgroup of the Life Cycle variable whose share increased the most (2.8 percentage points)[35]. This subgroup is also, and by far, the subgroup of the population that relies on the smallest average market income ($16,732 in 1996, compared to $47,531 for couples without children under 16[36]). While the relative size of the poorer groups increased (single mothers and unattached individuals over 45), the richer group (couples over 45 without children under 16) benefited from the largest increase in average market income (11.0 per cent).

The Role of Population Ageing

Between 1986 and 1996, the population share of families reporting at least one member aged 65 or over increased by 2.1 percentage points during the 10-year period under

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[33] See Table C8 in the appendix.

[34] The adjusted per capita income of the average Canadian family was $30,797 in 1986 (1996 dollars).

[35] See Table C7 in the appendix.

[36] Unless otherwise stated, dollar amounts are in adjusted per capita terms.

study[37]. Although there is an important average market income gap between elderly and non-elderly families ($15,784 for one-senior families, $18,764 for two-senior families and $34,644 for non-elderly families in 1996), the Number of Seniors variable explained a mere 0.6 per cent of the growth in market income inequality[38]. Table 6 reveals that two opposite forces were at work. First, the positive share contribution results from the passage from a high-income subgroup to a low-income subgroup at the time of retirement. Second, the between contribution has the reverse sign as a result of the two-senior families experiencing a strong 13.4 per cent *increase* in their average market income. During the same period, the average market income of one-senior families increased by only 1 per cent, and that of non-elderly families by a small 0.9 per cent. The data thus suggest that, at the same time that their relative number increased, elderly families disposed of higher financial resources from market sources, namely income from private pensions and investment.

The 2.1 percentage point increase in the share of families counting at least one senior corresponds to nearly half the increase in the share of families with no earners (4.8 percentage points). Moreover, part of the observed decrease in the employment rate is also probably attributable to the increase in *early* retirement, which is not captured by the Number of Seniors variable. Indeed, Baker and Benjamin (1999) report strong evidence of a trend towards early retirement since 1980. Many retired individuals are thus not reported as seniors in the SCF simply because they are under 65 years old. However, their presence is detectable indirectly by comparing the 1996 average income of the 55-64 age group ($36,212) to their situation 10 years before[39]. In 1986, those people were in the 45-54 age group, which had an average market income of $40,651. Therefore, this 'cohort'[40] experienced a significant decline in its market income between 1986 and 1996, which can certainly be explained in part by the rise in early retirement. According to the Labour Force Survey, only 40.3 per cent of men 60-64 were employed in 1996, 11 percentage points less than in 1986. Therefore, the Number of Seniors variable understated the inequality increasing effect of population ageing.

The overall impact of the changing age distribution, i.e. population ageing, is captured by the Age variable. According to our Theil decomposition, it explained 6 per cent of market income inequality growth between 1986 and 1996. More than just reflecting the same trends than the Number of Seniors variable, the Age variable also sheds some light on trends affecting the income gap between younger and older families. Again, conflicting forces are present. The population share of young families (head younger than 35) decreased importantly (by 7.3 percentage points). Meanwhile, the average income of this subgroup declined sharply: 15.9 per cent for families with a head younger than 25, and

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[37] See Table C5 in the appendix.

[38] It must be kept in mind that SCF data covers only the population of individuals living in private households, thus excluding individuals living in institutions.

[39] See Table C4 in the appendix.

[40] Given that the SCF data is cross-sectional only, we are using the term 'cohort' in a loose way.

5.9 per cent for families with a head in the 25-34 age group. The 35-44 age group also experienced a small drop in its average market income (2.7 per cent). In contrast, the three eldest age groups (including the 65 and older) saw their average market income rising. The increasing income gap between younger and older families can (loosely) be held responsible for 5.4 per cent of the rise in market income inequality between 1986 and 1996 (the difference between Age and Number of Seniors).

The next section looks at how the tax and transfer system has dealt with the various forces tending to increase inequality identified in this section.

3. The Tax and Transfer System under Inequality Increasing Pressures

In the previous section, decomposing *market* income inequality allowed us to identify the factors affecting the dispersion of market incomes. We now turn to *disposable* income inequality, in order to study how the tax and transfer system has offset inequality arising from the markets in the 1980s and the 1990s. Two hypotheses can be formulated to explain how this happened. First, the tax and transfer system might have acted as an 'automatic stabilizer'. According to this first hypothesis, the stable trend in disposable income inequality would be attributable to the actual design of the Canadian tax and transfer system. Second, *changes* to the tax and transfer system – e.g. tax increases – might have increased its 'equalizing power' while, at the same time, market income inequality was rising. Which of these hypotheses is the best to describe what actually happened between 1986 and 1996? Moreover, should taxes *or* transfers programmes be credited for the stable trend in disposable income inequality? This section supplies some elements of an answer to these two questions.

In Section 3.1, we assess the impact of public redistribution on between-group inequality. We learned in Section 2 that we could explain an important portion of market income inequality by dividing the population of families according to their different characteristics. However, between-group inequality does not explain all the growth in market income inequality. In order to analyze the impact of public redistribution on both between-group and within-group inequality, we present a decomposition of the Gini coefficient by income sources in Section 3.2. This complementary exercise allows us to compare the respective equalizing effect of transfers and taxes.

3.1 Public Redistribution and Between-Group Inequality

In this subsection, we repeat the Theil decomposition, this time including taxes and transfers, in order to analyze the impact of the tax and transfer system on the explanatory power of our variables. Table 7 (on the next page) corresponds to Table 3 in Section 2.1, but for disposable income. It reports the explanatory powers of the variables in both years (φ' in equation 2). The results show that the explanatory powers are smaller for disposable income than for market income, except for Number of Adults, Single Parenthood and Life Cycle. The difference between both income concepts is particularly striking for Labour Market Situation (falling from 35.2 per cent for market income to 21.8 per cent for disposable income in 1996), Labour Force Attachment (from 27.0 to 12.3) and Number of Seniors (from 8.5 to a mere 1.4).

Table 7. Decomposition of the Theil Index, Explanatory Powers, 1986 and 1996, Disposable Income

Variable	*1986 (%)*	*1996 (%)*
Labour market variables		
Labour Market Situation	19.4	21.8
Education	16.1	17.2
Labour Force Attachment	12.1	12.3
Demographic variables		
Life Cycle	14.1	15.4
Single Parenthood	12.9	14.7
Number of Adults	11.4	13.0
Age	7.8	7.2
Number of Seniors	1.8	1.4
Geographic variable		
Region of Canada	1.2	2.0

The comparison of both series of results (Tables 3 and 7) suggests that the equalizing effect of Canada's tax and transfer system has had an uneven effect on between-group inequality arising from different family characteristics. The following equation allows us to summarize the results of both tables in a single number that we will refer to as the 'equalizing effect':

$$\rho^t = \frac{between^t_{market} - between^t_{disposable}}{between^t_{market}} \quad (5)$$

ρ^t is therefore the equalizing effect of the tax and transfer system with respect to between-group inequality arising from a specific variable in year t. It is clear that to measure the equalizing effect in such an accounting way is a simplification. In particular, this approach does not account for the impact of taxes and transfers on the distribution of *market* incomes through behavioural responses (e.g. the tax and transfer system may discourage individuals to work or save, which may in turn alter the income distribution). It must also be kept in mind that our analysis does not take into account the equalizing effect of transfers in kind (such as health care and education), neither does it include indirect taxes[41]. Table 8 reports the equalizing effect of the tax and transfer system for each of our variables in both years.

[41] See Appendix B for details on income components of the SCF.

Table 8. Equalizing Effect of the Tax and transfer system, 1986 and 1996

Variable	*1986 (%)*	*1996 (%)*
Number of Seniors	91.1	92.7
Labour Force Attachment	77.8	80.6
Age	74.7	77.4
Labour Market Situation	71.0	73.2
Region of Canada	56.8	38.9
Education	50.9	58.0
Life Cycle	44.0	45.4
Single Parenthood	39.8	46.2
Number of Adults	31.2	39.3

Table 8 shows that, in both years, the equalizing effect was the strongest for the Number of Seniors variable. The inclusion of taxes and transfers indeed decreased the inequality attributed to the number of seniors in the family by 92.7 per cent in 1996. The ranking of the variables was the same in both years, except for Region of Canada (whose explanatory power is by far the smallest), and for a switch between Life Cycle and Single Parenthood. The Labour Force Attachment variable was subject to the second highest impact of taxes and transfers (80.6 per cent in 1996). The important equalizing effect for those two variables is not surprising. Each of them isolates a subgroup that is well targeted by the tax and transfer system, i.e. the retired individuals and the unemployed. Public transfers represent an important share of the disposable income of these two subgroups, either Employment Insurance (EI), Old Age Security (OAS) or provincial social assistance benefits (SA).

The other variables divide the population according to characteristics that are not as directly targeted by the tax and transfer system. For example, the impact of the tax and transfer system on the Age variable is roughly 15 percentage points lower than for the Number of Seniors variable because there is no transfer programme whose goal is to put younger and older workers on an equal footing. The same remark applies to the difference between Labour Market Situation and Labour Force Attachment: achieving equality between the average part-time and full-time workers is not the goal of any transfer programme in Canada. In the same way, the equalizing effect of the tax and transfer system is a lot smaller for Education (only 58 per cent in 1996).

The fact that Number of Adults shows the lowest equalizing effect deserves special attention. In Section 2.1, we have highlighted the fact that most inequality arising from this variable is attributable to the economies of scale associated with family size. Stated differently, the relatively high contribution of the Number of Adults variable to market income inequality is due to our use of an equivalence scale aimed to embody those economies of scale in the money amounts reported in the SCF. Some transfer programmes (e.g. OAS) and some dispositions of the tax system take this reality into account by differentiating the benefits of couples and singles. The low equalizing effect that we find for Number of Adults reveals that our adjustment for economies of scale is

considerably stronger than the effective adjustment embodied in the tax and transfer system. The stronger equalizing effect for Single Parenthood and Life Cycle is consistent with the fact that some fiscal measures are specifically targeted towards families with children (e.g. Child Tax Benefit).

The equalizing effect is higher in 1996 than in 1986 for all variables but Region of Canada[42]. In particular, it increased by 2.8 percentage points for Labour Force Attachment. This increase must either be the result of increased transfer payments, or of an increase in the progressivity of the income tax schedule. Table C2 in the appendix reveals that the average amount of net transfers received by families with no earners was approximately the same in 1986 and 1996 ($10,110 in 1986 and $10,466 in 1996, a 3.5 per cent increase[43]). Average net transfers to one-senior families rose by 7.3 per cent. On the other hand, average net taxes paid by families with one or more earners increased by 28.1 per cent. This suggests that tax increases were mainly responsible for the amelioration of the equalizing effect for the Labour Force Attachment variable. For the other variables, the amelioration is the result of different combinations of higher average transfer payments to low-income groups and rising taxes.

To what extent can this greater equalizing effect be credited for the stability of disposable income inequality between 1986 and 1996? To compute the equalizing effect of the tax and transfer system with regards to the *change* in market income inequality attributable to a specific variable, we use the following modified version of equation 5:

$$\hat{\rho} = \frac{\Delta between_{market} - \Delta between_{disposable}}{\Delta between_{market}} \qquad (6)$$

A way of interpreting $\hat{\rho}$ is the portion of 'new' market income inequality that the tax and transfer system was able to offset. Table 9 shows that the equalizing effect of the tax and transfer system has been higher for the *change* in market income inequality than for the levels in 1986 and 1996 (Table 8) for all variables but Region of Canada. This is consistent with the direction of the changes in the annual equalizing effects that we observe in Table 8.

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[42] It must be kept in mind that the equalizing effects for Region of Canada are computed on the basis of very small between-group contributions. However, the diminution between 1986 and 1996 can probably be attributed to tax reductions in Ontario. The average net taxes decreased in that province over the period, while they increased importantly in Quebec and Western Canada. See Table C9 in the appendix for details.

[43] These amounts are in per capita terms, adjusted and in 1996 dollars.

Table 9. Equalizing Effect of the Tax and transfer system on Changes in Between-Group Inequality, 1986-1996

Variable	*Change in Between Contribution (Market Income)*	*Change in Between Contribution (Disposable Income)*	*Equalizing Effect (%)*
Labour market variables			
Labour Force Attachment	0.0175	0.0009	94.9
Labour Market Situation	0.0296	0.0048	83.8
Demographic variables			
Number of Seniors	0.0003	-0.0005	266.7
Age of head	0.0032	-0.0006	118.8
Single Parenthood	0.0108	0.0036	66.7
Number of Adults	0.0087	0.0031	64.4
Life Cycle	0.0060	0.0027	55.0
Geographic variable			
Region	0.0010	0.0014	-40.0

The first important result is the 94.9 per cent equalizing effect for the Labour Force Attachment variable. We know from Section 2 that the decline in employment explained about one third of market income inequality growth. The tax and transfer system almost entirely offset this inequality increasing trend. From Table 8, we can infer that most of the equalization was due to the tax and transfer system acting as an automatic stabilizer to higher unemployment (the annual equalizing effect was 77.8 per cent in 1986). Nevertheless, rising taxes on the employed population reinforced significantly the equalizing effect of the tax and transfer system with regards to Labour Market Attachment. The same can be observed for Labour Market Situation, Single Parenthood, Number of Adults and Life Cycle.

Those results reveal that the 'automatic stabilizer' effect of the tax and transfer system offset an important portion of the rise in *between-group* inequality, although unevenly. The equalizing effect was stronger for age-related variables (Number of Seniors and Age) and for labour market variables, but considerably weaker for family structure variables. However, it must be kept in mind that this decomposition exercise only deals with between-group inequality, i.e. the inequality that can be explained by observable characteristics of the families. Even if we can explain an important portion of the rise in market income inequality between 1986 and 1996 through between-group inequality, a significant portion remains unexplained by such an analysis. Therefore, the tax and transfer system must also have offset rising *within-group* inequality, i.e. the inequality that we have not been able to explain through our limited set of variables. The next subsection completes the analysis of the equalizing role of taxes and transfers by looking at within-group inequality.

3.2 Transfers, Taxes and Within-Group Inequality

In Section 3.1, we argued that the tax and transfer system was relatively good at targeting between-group inequality, especially through transfer programmes aimed at specific groups (such as EI, OAS and SA) that act as automatic stabilizers in response to increases in market income inequality. We now turn to within-group inequality. We limit ourselves to the study of inequality within only one subgroup, that is, non-senior families with at least one member in the labour force. Not only do we restrict ourselves to this unique subgroup because of space limitations, but also because public transfers represent a very small share of the total income of this particular subgroup. It will thus allow us to focus on the equalizing effect of *taxes*.

For this particular subgroup of the population only, we present the results of a decomposition developed by Lerman and Yitzhaki (1985). We calculate the contribution of different *income sources* to disposable income inequality, i.e. private sources (labour earnings, investment income and pensions), public transfers and taxes. To do so, we decompose the Gini coefficient (G) into three elements: the correlation of each income category relative to disposable income inequality[44] (R_k); the inequality within each category of income (G_k); and the share of each category within disposable income (S_k). The following equation expresses this decomposition:

$$G = \sum_{k=1}^{K} R_k G_k S_k \qquad (7)$$

where k represents income categories.

Table 10 (on the next page) presents the contribution of each income source to the Gini coefficient in both years. Unlike in the Theil decomposition, the contributions can be summed together and add up to the total Gini coefficient.

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[44] Lerman and Yitzhaki (1985) refer to R_k as the 'Gini correlation'. It corresponds to the following ratio of covariances: $R_k = \text{cov}(y_k, F)/\text{cov}(y_k, F_k)$, where y_k is income from source k, F_k is the cumulative distribution of income source k, and F is the cumulative distribution of disposable income. Therefore, R_k is equal to zero if a particular component (k) and disposable income inequality are independent, and it is equal to 1 (-1) if they are perfectly positively (negatively) correlated.

Table 10. Decomposition of the Gini Coefficient by Income Sources, Non-Senior Families with at Least One Earner, 1986 and 1996

Variable	*1986*	*1996*	*Difference*	*Difference (% of Change in Market Income)*
Income from market sources				
Wages and Salaries	0.3293	0.3581	0.0288	90.0
Self-employment Income	0.0275	0.0370	0.0095	29.7
Investment and Pension Income[45]	0.0283	0.0220	-0.0063	-19.7
Total (Market Income)	*0.3851*	*0.4171*	*0.0320*	*100.0*
Income from public sources				
Transfers[46]	-0.0049	-0.0036	0.0013	4.1
Taxes	-0.0929	-0.1202	-0.0273	-85.3
Total (Public Sources)	*-0.0978*	*-0.1238*	*-0.0260*	*-81.2*
Total (Disposable Income)	***0.2873***	***0.2933***	***0.0060***	***18.8***

Source: Own calculations with a program provided by Shlomo Yitzhaki (Economics Department, University of Jerusalem).

The rise of within-group market income inequality appears clearly in the upper panel of the table. From 1986 to 1996, the contribution of market sources to the disposable income Gini coefficient increased from 0.3851 to 0.4171, an 8.3 per cent increase. The last column reveals that 90 per cent of the increase came from wages and salaries, thus suggesting that wages became more unequally distributed (which is consistent with the increase in part-time work outlined in Section 2.4). The increasing prevalence of self-employment[47] was responsible for an additional 29.7 per cent of the rise in market income inequality. On the other hand, the contribution of investment income decreased by 19.7 per cent between 1986 and 1996.

Despite the 8.3 per cent increase in market income inequality within the group of non-elderly families with at least one earner, the Gini coefficient for disposable income (last line of the Table 10) only rose by 2.1 per cent. Our results show that taxes played the crucial role in offsetting the rise in market income inequality within this subgroup. They offset 85.1 per cent of the increase in the market income Gini coefficient. Meanwhile, this decomposition exercise suggests that the equalizing contribution of transfers indeed *decreased*.

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[45] Pension income and Investment income have been pooled given the marginal importance of pensions for non-elderly families.

[46] Transfers include the following income categories (see Appendix B): Elderly-specific transfers, Public pensions and Other transfers.

[47] Self-employment income accounted for 5.8 per cent of market income in 1986, and for 8.0 per cent in 1996.

Between 1986 and 1996, the average net taxes paid by most groups of the population rose a lot more than their average market income. The progressivity of the tax schedule was increased by the imposition of surtaxes to fight growing deficits and by the partial suspension of tax bracket indexation to the cost of living. As an illustration, the average net taxes paid by non-elderly families rose by 15.9 per cent over the period, while their average market income increased by a mere 0.9 per cent[48]. Even if the Canadian tax and transfer system was able to offset a fair portion of between-group inequality (as shown in Section 3.1), our results suggest that disposable income inequality would probably have risen significantly if taxes had remained at their 1986 level.

[48] See table C5 in the appendix.

4. Conclusion: Understanding the Past to Project Future Trends

The objective of this paper was to provide a comprehensive picture of recent trends affecting family income inequality in Canada. It was motivated by the need for a better understanding of the diverging trends in market and disposable income inequality. Using a decomposition approach, we examined three summary measures of the income distribution of all Canadian families (the Gini coefficient, the Theil index and the mean logarithmic deviation). Our specific goals were: (i) to explain growth in market income inequality between 1986 and 1996 by alternatively dividing the population into groups of families sharing similar economic or demographic characteristics, and (ii) to explore the mechanisms through which the tax and transfer system was able to offset this upward trend.

We found that economic as well as demographic characteristics of families explained a significant portion of market income inequality levels in 1986 and 1996. Unsurprisingly, family characteristics related directly to the labour market explained the highest portion of market income inequality: labour market situations (explaining about one third of the annual level) and education (more than 15 per cent). Age-related characteristics have also been significant factors of inequality: 10-year age groups (nearly 15 per cent) and differences between senior and non-senior families (nearly 10 per cent). Inequality also arose from the market income gap between families with and without children (especially single mothers), and between individuals living alone and the rest of the population. The latter factor (the lower incomes of singles) explained nearly 10 per cent of the inequality level. However, this proportion is highly dependent upon the assumption that families generate important economies of scale in consumption. Finally, we found that the geographical location of dwellings across regions of Canada was not an important factor of inequality.

As expected, economic and demographic characteristics of the family are far from explaining 100 per cent of the level of market income inequality. Among others, a better decomposition of labour market situation by industrial sectors would potentially explain an additional portion[49]. Moreover, inequality is a complex economic phenomenon, and we have to acknowledge that personality, chance and even genetics may also play important roles. However, unlike economic and demographic characteristics of the family – which evolve over time – psychology and genetics are not plausible candidates to explain inequality *growth*. Indeed, we found that our variables explained a higher portion of inequality growth than they explained inequality levels.

Between 1986 and 1996, one third of market income inequality growth was attributable to an increase in the non-working population. The rise of part-time work and the increase in the earnings of prime-age women contributed an additional 20 per cent. A significant portion of the rise in market income inequality can also be attributed to demographic

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[49] Due to changes to the job classification variables in the SCF, we decided to stay away from this issue in this paper.

factors. The decline of marriage and population ageing (among others) result in a growing population of individuals living alone, a group who does not benefit from the economies of scale offered by the family. Increasing 'singleness' explained more than 15 per cent of market income inequality growth (once the economies of scale associated with family size are taken into account). The increase in the population share of single mothers, a group with a declining average market income, contributed approximately 5 per cent to inequality growth. The direct impact of population ageing was felt through the intensification of retirement and early retirement. However, age-related characteristics have only been marginal inequality increasing factors between 1986 and 1996. Indeed, *equalizing* forces related to population ageing were also at work: the population share of young families (a group with low and declining market income) has declined sharply, and newer cohorts of retired individuals rely on higher financial resources from market sources (e.g. private pension plans and personal savings) than their elders.

Between 1986 and 1996, the inequality increasing trends in market income were almost entirely offset by the tax and transfer system. Was it the result of existing programmes or of changes to the tax and transfer system? The equalizing effect of the tax and transfer system was very high with regards to inequality arising from non-participation to the labour force (almost 95 per cent), the most important inequality increasing force, and from retirement (more than 100 per cent). Those results highlight the role of the tax and transfer system (especially that of targeted transfer programmes) as an 'automatic stabilizer' in response to between-group inequality arising from the markets. Because of the high equalizing effect of the tax and transfer system with regards to labour market situations, most of the 'new' between-group inequality was offset. However, taxes and transfers were less able to reduce inequality due to family size, parenthood and education. Less than half of market income inequality attributable to these three characteristics was offset by public redistribution.

However, the 'automatic stabilization' argument is not entirely satisfactory to explain the stable trend in disposable income inequality observed over the last twenty years. Indeed, we cannot explain all the growth in market income inequality through between-group inequality. *Within-group* inequality – which is not as easily targeted by transfer programmes as between-group inequality – must also be considered. Disposable income inequality in fact *decreased* significantly between 1986 and 1996 within the two biggest subgroups of the Labour Market Situation variable: families where both spouses work full time, and families with only one spouse working full time. Our results suggest that rising taxes (especially for high-income families) played the main role in this decline. Between 1986 and 1996, the share of taxes in the income of the average Canadian family increased, while employment earnings remained roughly at the same level. Our conclusion is that the automatic stabilization effect of transfer programmes *and* the rise in personal income taxes explain the success of the Canadian tax and transfer system in offsetting market income inequality growth in the 1980s and the 1990s.

A natural question arises from this conclusion: what will happen in the future to the trends in market and disposable income inequality? 1986-1996 was a period of rising taxes, characterized by the imposition of surtaxes and the partial suspension of tax

bracket indexation. The coming decade promises to be one of tax reductions, that are likely to put upward pressure on disposable income inequality. On the other hand, employment has been on the rise since 1996. This trend should put downward pressure on market income inequality, despite the potentially important inequality increasing effect of population ageing. The latter demographic phenomenon was still in its infancy in the 1980s and 1990s, but it is likely to put important upward pressure on market income inequality in the future when huge cohorts of baby-boomers will quit the labour market. Together with population ageing, family structures are currently experiencing important transformations. On the one hand, more people are living alone and more families with children are single-headed. On the other hand, ageing of the baby-boomers comes with an increase in the share of couples without children, theirs now starting their own families. Given the diverging trends in the relative market incomes of these two groups (baby-boomer couple without children and young families), we could expect an increase in both market and disposable income inequality.

In fact, projecting future trends in the distribution of incomes is far from trivial. Trends in summary measures of the income distribution rely on complex movements occurring simultaneously everywhere across the distribution. Consequently, projecting future trends in the income distribution requires micro-level simulations, which allow detailed modelling of heterogeneous populations. This paper is thus only the first step of a wider project aiming to assess the role of public redistribution in the context of a changing demographic environment. Demographic characteristics are essentially structural factors whose impact on the economic environment will affect Canada's collective well-being and policy-making for many years to come, especially when the baby-boomers will start to join the retired population. This research agenda calls for further investigation of the links between demographic characteristics, labour market attachment and family income. Relevant topics include the labour market situation of low-skilled and older workers, the maturation of RRSPs and the persistence of the trends towards increasing female labour-force participation, early retirement and family break-up.

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Appendix A: Database adjustment

A.1 Data exclusions

Table A1. Number of records used and excluded

	1986	*1996*
Records used	32,707	35,689
Records excluded	115	110
Number of families represented	10,223,146	12,197,343

The excluded records are those labelled as 'special family units' in the SCF. They are family units with exceptionally high incomes, large income losses from self-employment or unusual characteristics (e.g. large family size, large number of children). In the SCF, each record is weighted according to its representation in the total Canadian population. The numbers in the last row of the table are the sum of the sampling weights for each record.

A.2 Adjustment matrix

Table A2. Adjustment matrix

Size of family unit	*Size of area of residence*				
	500 000+	*100 000+*	*30 000+*	*30 000 –*[50]	*Rural Areas*
1	1.00	1.17	1.17	1.26	1.45
2	1.60	1.87	1.88	2.02	2.31
3	1.93	2.25	2.27	2.43	2.79
4	2.13	2.48	2.49	2.67	3.08
5	2.38	2.77	2.79	3.00	3.44
6	2.58	3.01	3.03	3.26	3.73
7+	2.75	3.21	3.23	3.47	3.98

We built this adjustment matrix using the 1992 based LICOs, reproduced in Table A3 (on the next page). Each coefficient in Table A2 is obtained by dividing the appropriate LICO

[50] Includes cities with population 15,000 and 30,000 and 'small urban areas' (under 15,000).

in Table A3 by 17,132 (the "equivalent income" of a one-person family living in a metropolitan area).

Table A3. Low Income Cut-offs for Family Income (Per Capita, 1992 Base), 1996

Size of family unit	*Size of area of residence*				
	500,000+	*100,000+*	*30,000+*	*30,000 –*	*Rural Areas*
1	17,132	14,694	14,591	13,577	11,839
2	10,707	9,184	9,120	8,486	7,400
3	8,878	7,615	7,561	7,036	6,135
4	8,060	6,913	6,865	6,388	5,570
5	7,207	6,182	6,139	5,712	4,981
6	6,639	5,695	5,655	5,262	4,588
7+	6,233	5,347	5,309	4,940	4,308

Source: Statistics Canada, Microdata File Documentation, Economic Families, Survey of Consumer Finances 1997, p. C-41.

These low income cut-offs were computed from the 1992 Survey of Family Expenditures (FAMEX). A family with a per capita income below the LICO typically spends 54.7 per cent or more of their income on food, shelter and clothing.

Appendix B: Income Components

We decompose family income in eight categories:

1. **Wages and salaries** give the sum of amounts reported by all individuals in the family as gross cash wages and salaries received during the reference year from all types of employment.

2. **Self-employment income** includes net income from self-employment in farm and non-farm activities (including net income from roomers and boarders).

3. **Investment income** includes interest received on bonds, deposits, and savings certificates from Canadian and foreign sources[51].

4. **Private pensions** report the sum of amounts reported by all individuals in the family as the result of having been a member[52] of a pension plan of one or more employers, except for pensions received from abroad[53].

5. **Elderly-specific transfers** represent the sum of amounts received by all individuals 65 years of age and over in the family on account of Old Age Security (OAS), Guaranteed Income Supplement (GIS) and Spouses' Allowances (SPA)[54].

6. **Public pensions** is the sum of amounts reported by all individuals in the family as benefits from the Canada/Quebec Pension Plan: retirement pensions, survivor's benefits such as widow's pensions, disabled widower's pensions, orphan's benefits, and disability pensions with benefits for dependent children of disability with benefits for dependent children of disability pensioners[55].

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[51] It also includes dividends received from Canadian and foreign corporate stocks, cash dividends received from insurance policies, net rental income from real estate and farms, interest received on loans and mortgages, regular income from an estate or trust fund and other investment income.

[52] Widows or other relatives of a deceased pensioner, who have pension rights under a pension plan or who become beneficiaries in cases guaranteed for a minimum period even if the pensioner dies, include this pension income here (unless it falls under the CPP or QPP Plan Benefits). Also, this category includes pensions of retired RCMP officers, armed forces personnel and civil servants, and annuity payments received from Canadian Government Annuities Fund, and insurance company or other sources whether or not it was this person who purchased the annuity originally. Pensions received from registered retirement savings plans in the form of a life annuity, a fixed term annuity, a registered retirement investment fund or an income-averaging annuity contract are also included.

[53] They are included under 'Other transfers'. Also, withdrawals from a pension plan or RRSP, or refunds of over-contributions as well as all lump sum benefits are not included.

[54] Supplements from provincial governments are included in 'Other transfers'.

[55] It excludes lump sum death benefits received under these plans.

7. **Other transfers** include a number of transfers such as the federal Child Tax Benefit[56], Employment Insurance Benefits, Social Assistance and Provincial Income Supplements, other Income from Government Sources[57], and other money transfers[58].

8. **Taxes** include federal and provincial income taxes, as stated on each individual tax return. Other taxes, such as commodity taxes, are not reported in the SCF.

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[56] It also includes payments from Quebec Family Allowances and Quebec Allowance for Newborn Children.

[57] These include refundable provincial tax credits; the Goods and Services Tax Credit as claimed on Individual Income Tax Return Forms; veteran's pensions; pensions to widows and dependants of veterans; civilian war allowances; worker's compensation; payments received from government training programs; Quebec Work Assistance programs; Quebec Maternity Allowance; regular payments received from provincial automobile insurance plans and provincial grants for home ownership promotion; mortgage interest rate reduction and property improvement.

[58] These transfers include money received for the care of children being cared for on behalf of the Children's Aid Society; income from abroad in Canadian dollar equivalent (excluding interest and dividends); non-refundable scholarships and bursaries; alimony; royalties; strike and sick pay from trade unions; payments from an income maintenance insurance plan or a guaranteed annual wage plan; severance pay or retiring allowances (not regular pension benefits).

Appendix C: Descriptive Statistics

C.1 LABOUR MARKET VARIABLES

Table C1. Labour Market Situation

Subgroup	*Population share 1986 (%)*	*Population share 1996 (%)*	*Average market p.c.a[59]. income 1986 (1996 $)*	*Average market p.c.a. income 1996 (1996 $)*	*Average p.c.a. net taxes 1986 (1996 $)*	*Average p.c.a. net taxes 1996 (1996 $)*
Both spouses working full-time	24.8	22.4 (-2.4)	46,073	50,324 (+9.2%)	6,934	9,666 (+39.4%)
Both spouses working part-time	0.4	0.9 (+0.5)	28,557	31,196 (+9.2%)	180	663 (+268.3%)
One spouse working full-time and one part-time	10.0	11.0 (+1.0)	39,421	41,231 (+4.6%)	5,379	6,835 (+27.1%)
Head or spouse working (full-time)	37.4	31.6 (-5.8)	32,207	33,574 (+4.2%)	3,908	4,931 (+26.2%)
Head or spouse working (part-time)	4.8	6.7 (+1.9)	18,340	18,154 (-1.0%)	-2,127	-1,964 (+7.7%)
Head and spouse not working living with other earners	3.7	3.1 (-0.6)	22,026	23,456 (+6.5%)	-5,528	-6,166 (-11.5%)
No earners in the family	18.8	24.2 (+5.4)	8,285	8,913 (+7.6%)	-10,251	-10,510 (-2.5%)

Table C2. Labour Force Attachment

Subgroup	*Population share 1986 (%)*	*Population share 1996 (%)*	*Average market p.c.a. income 1986 (1996 $)*	*Average market p.c.a. income 1996 (1996 $)*	*Average p.c.a. net taxes 1986 (1996 $)*	*Average p.c.a. net taxes 1996 (1996 $)*
No earners in the family	19.7	24.5 (4.8)	8,166	8,882 (+8.8%)	-10,110	-10,466 (-3.5%)
One earner or more in the family	80.3	75.5 (-4.8)	36,355	37,955 (+4.4%)	4,328	5,543 (+28.1%)

[59] Per capita adjusted.

Table C3. Education

Subgroup	*Population share 1986 (%)*	*Population share 1996 (%)*	*Average market p.c.a. income 1986 (1996 $)*	*Average market p.c.a. income 1996 (1996 $)*	*Average p.c.a. net taxes 1986 (1996 $)*	*Average p.c.a. net taxes 1996 (1996 $)*
Head has no post-secondary diploma and no spouse	29.5	37.4	18,389	18,644	-2,338	-4,066
Head has a post-secondary diploma and no spouse	10.6	6.0	32,460	38,851	4,197	3,220
Head and spouse have no post-secondary diploma	38.3	43.6	31,199	33,760	531	-1,148
Head has a post-secondary diploma but not the spouse	7.0	5.0	42,976	49,465	6,156	4,043
Spouse has a post-secondary diploma but not the head	5.6	3.1	41,939	49,052	4,881	4,324
Head and spouse have a post-secondary diploma	9.1	4.9	51,216	57,278	9,040	9,023

Note: Unlike for the other variables, the time variations are not reported for this variable because of a change in the definition of the subgroups between the two years.

C.2 DEMOGRAPHIC VARIABLES

Table C4. Age

Subgroup	*Population share 1986 (%)*	*Population share 1996 (%)*	*Average market p.c.a. income 1986 (1996 $)*	*Average market p.c.a. income 1996 (1996 $)*	*Average p.c.a. net taxes 1986 (1996 $)*	*Average p.c.a. net taxes 1996 (1996 $)*
Head less than 25 years old	8.4	5.8 (-2.7)	20,405	17,167 (-15.9%)	1,272	269 (-78.9%)
Head 25 to 34	24.6	20.0 (-4.6)	32,886	30,945 (-5.9%)	4,084	3,677 (-10.0%)
Head 35 to 44	21.1	23.8 (+2.7)	36,557	35,555 (-2.7%)	4,998	5,435 (+8.7%)
Head 45 to 54	14.6	18.7 (4.1)	40,651	41,501 (+2.1%)	5,293	6,672 (+26.1%)
Head 55 to 64	13.8	12.5 (-1.3)	35,160	36,212 (+3.0%)	2,541	3,225 (+26.9%)
Head 65 and over	17.4	19.2 (+1.8)	14,170	14,991 (+5.8%)	-10,396	-10,858 (-4.4%)

Table C5. Number of Seniors

Subgroup	*Population share 1986 (%)*	*Population share 1996 (%)*	*Average market p.c.a. income 1986 (1996 $)*	*Average market p.c.a. income 1996 (1996 $)*	*Average p.c.a. net taxes 1986 (1996 $)*	*Average p.c.a. net taxes 1996 (1996 $)*
No senior	80.8	78.7 (-2.1)	34,349	34,644 (+0.9%)	4,128	4,783 (+15.9%)
1 senior	13.2	14.5 (+1.4)	15,629	15,784 (+1.0%)	-8,177	-8,771 (-7.3%)
2 seniors	6.0	6.8 (+0.7)	16,552	18,764 (+13.4%)	-12,703	-12,765 (-0.5%)
3 seniors and more	*	*	*	*	*	*

* Sample too small.

Table C6. Number of Adults

Subgroup	*Population share 1986 (%)*	*Population share 1996 (%)*	*Average market p.c.a. income 1986 (1996 $)*	*Average market p.c.a. income 1996 (1996 $)*	*Average p.c.a. net taxes 1986 (1996 $)*	*Average p.c.a. net taxes 1996 (1996 $)*
1 adult	33.5	36.5 (+3.0)	21,048	20,305 (-3.5%)	-519	-1,083 (-108.7%)
More than one adult	66.5	63.5 (-3.0)	35,708	36,866 (+3.2%)	2,489	3,166 (+27.2%)

Table C7. Life Cycle

Subgroup	*Population share 1986 (%)*	*Population share 1996 (%)*	*Average market p.c.a. income 1986 (1996 $)*	*Average market p.c.a. income 1996 (1996 $)*	*Average p.c.a. net taxes 1986 (1996 $)*	*Average p.c.a. net taxes 1996 (1996 $)*
Unattached individual, under age 45	16.8	15.8 (-1.0)	26,880	26,094 (-2.9%)	3,803	3,659 (-3.8%)
Unattached individual, age 45 and over	13.4	16.3 (+2.8)	15,574	16,732 (+7.4%)	-5,350	-5,054 (+5.5%)
Husband-wife family, head under age 45, no children under age 16	9.7	8.3 (-1.4)	47,049	47,531 (+1.0%)	7,307	8,351 (+14.3%)
Husband-wife family, head under age 45, with children under age 16	22.3	18.5 (-3.8)	33,321	33,865 (+1.6%)	4,010	4,878 (+21.6%)
Husband-wife family, head age 45 and over, no children under age 16	23.1	24.8 (+1.7)	35,801	37,900 (+5.9%)	-149	756 (–)
Husband-wife family, head age 45 and over, with children under age 16	4.9	5.0 (+0.1)	34,560	38,370 (+11.0%)	3,259	6,209 (+90.5%)
All other families	9.8	11.3 (+1.5)	22,866	21,651 (-5.3%)	-1,691	-2,066 (-22.2%)

Table C8. Single Parenthood

Subgroup	*Population share 1986 (%)*	*Population share 1996 (%)*	*Average market p.c.a. income 1986 (1996 $)*	*Average market p.c.a. income 1996 (1996 $)*	*Average p.c.a. net taxes 1986 (1996 $)*	*Average p.c.a. net taxes 1996 (1996 $)*
Single males	14.6	15.9 (+1.3)	26,745	26,469 (-1.0%)	2,240	2,023 (-9.7%)
Single females	15.6	16.2 (+0.6)	17,292	16,323 (-5.6%)	-2,600	-3,482 (-33.9%)
Single males with children	0.4	0.5 (+0.1)	27,936	24,460 (-12.4%)	2,175	1,372 (-36.9%)
Single females with children	2.9	3.8 (+0.9)	11,590	10,964 (-5.4%)	-3,603	-4,191 (-16.3%)
Other families	66.5	63.5 (-3.0)	35,708	36,866 (+3.2%)	2,489	3,166 (+27.2%)

C.3 GEOGRAPHIC VARIABLE

Table C9. Region of Canada

Subgroup	*Population share 1986 (%)*	*Population share 1996 (%)*	*Average market p.c.a. income 1986 (1996 $)*	*Average market p.c.a. income 1996 (1996 $)*	*Average p.c.a. net taxes 1986 (1996 $)*	*Average p.c.a. net taxes 1996 (1996 $)*
Atlantic	8.0	7.8 (-0.2)	26,544	26,372 (-0.6%)	-1,844	-1,968 (-6.7%)
Quebec	26.0	26.2 (+0.2)	27,449	26,768 (-2.5%)	806	1,181 (+46.5%)
Ontario	36.4	36.3 (-0.1)	33,907	34,060 (+0.5%)	2,779	2,447 (-11.9%)
Prairies	8.1	7.1 (-1.0)	29,502	29,438 (-0.2%)	616	1,059 (+71.9%)
Western	21.6	22.7 (+1.1)	31,637	32,274 (+2.0%)	1,660	2,186 (+31.7%)

Note: The Atlantic region includes Newfoundland and Labrador, Nova-Scotia, New-Brunswick and Prince-Edward-Island. The Prairies are Manitoba and Saskatchewan. Western Canada is composed of Alberta and British-Columbia. The three territories are excluded.

Appendix D. Formulae of Inequality Indices

D.1 The Gini coefficient

$$G = \frac{1}{2n^2 \mu(y)} \sum_{i=1}^{n} \sum_{j=1}^{n} |y_i - y_j|$$

where n is the size of the population, $\mu(y)$ is the mean income of the population and $|y_i - y_j|$ is the absolute value of the difference in income of a given pair of families $\{i, j\}$.

D.2 The Generalized Entropy Indices

If y_i is the income of family i and $\mu(y)$ is the average income of all families, the Generalized entropy measures of inequality $E(\alpha)$ are defined by the following formula:

$$E(\alpha) = \frac{1}{\alpha^2 - \alpha} \left[\frac{1}{n} \sum_{i=n}^{n} \left(\frac{y_i}{\mu(y)} \right)^{\alpha} - 1 \right]$$

The members of this family of measures differ by the value of α. In this paper, we use two specific case: $\alpha = 0$, the MLD, and $\alpha = 1$, known as the 'Theil index'. The following formulae can be obtained after some basic manipulations:

$$E(0) = \frac{1}{n} \sum_{i=1}^{n} \log \left(\frac{\mu(y)}{y_i} \right)$$

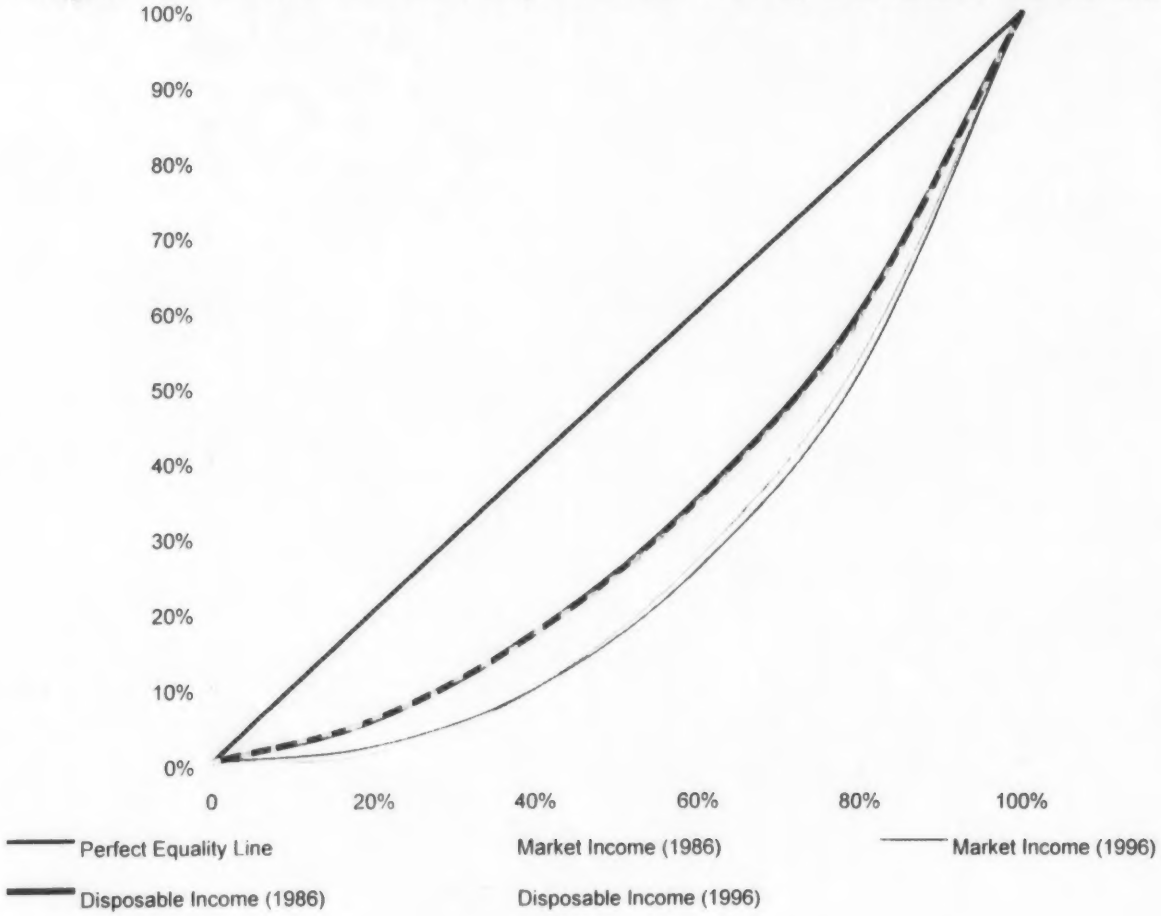
$$E(1) = \frac{1}{n} \sum_{i=1}^{n} \frac{y_i}{\mu(y)} \log \left(\frac{y_i}{\mu(y)} \right)$$

Appendix E. Variables

Labour Market Situation	**Education**
Both spouses working full-time	Head has no post-secondary diploma and no spouse
Both spouses working part-time	Head has a post-secondary diploma and no spouse
One spouse working full-time and one part-time	Head and spouse have no post-secondary diploma
Head[60] or spouse working (full-time)	Head has a post-secondary diploma but not the spouse
Head or spouse working (part-time)	Spouse has a post-secondary diploma but not the head
Head and spouse not working living with other earners	Head and spouse have a post-secondary diploma
No earners in the family	
Labour Force Attachment	**Age**
No earners in the family	Head less than 25 years old
One earner or more in the family	Head 25 to 34
	Head 35 to 44
	Head 45 to 54
	Head 55 to 64
	Head 65 and over
Number of Seniors	**Number of Adults**
No senior	1 adult
1 senior	More than one adult
2 seniors	
3 seniors and more	
Single Parenthood	**Life Cycle**
Single males	Unattached individual, under age 45
Single females	Unattached individual, age 45 and over
Single males with children	Husband-wife family, head under age 45, no children under age 16
Single females with children	Husband-wife family, head under age 45, with children under age 16
Other families	Husband-wife family, head age 45 and over, no children under age 16
	Husband-wife family, head age 45 and over, with children under age 16
	All other families
Region of Canada	
Atlantic	Prairies
Quebec	Western
Ontario	

[60] In the SCF, the husband always heads a two-parent family. Except for some special cases (lone-parent families with married children and families where relationships are other than husband-wife or parent-child), a woman heads her economic family only if she is a single mother or if she lives alone.

Figure 2. Lorenz Curves, All Families, Canada, 1986-96



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